Availability and Potential of Forage Production for Dairy Cattle in Ambopi Village, North Tongauna District, Konawe Regency

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ABSTRACT
The availability of forage feeds greatly determines the productivity of ruminants. This study aims to determine the availability and potential of forage production for dairy cows in Ambopi village North Tongauna District, Konawe District. The method used in this study was survey carried out by purposive sampling. Data were analysed using descriptive analysis. The variables observed in this study were forages, analysis of chemical composition i.e. dry matter (DM), crude protein (CP), crude fiber (CF), extract ether (EE) and total digestible nutrient (TDN) and production and availability of grass. The results showed that there were 3 types of grass namely elephant grass (*Pennisetum purpureum*), odot grass (*Pennisetum purpureum* cv Mott) and setaria grass (*Setaria sphacelata*). Average nutrient production of the three types of grass was 94.09 tons DM/ha/year, 13.19 tons CP/ha/year and 39.32 tons TDN/ha/year. It is concluded that the number of available forages has not been able to meet the needs of dairy cows because the number of dairy cows that can be accommodated is only 5 AU (Animal Unit) for 1 year in Ambopi Village.

Keywords: *Dairy Cattle, Konawe District and Forage.*

1. INTRODUCTION

Livestock sub-sector is one of the priority development activities because it has an important role in meeting the needs of animal protein for the community [1]. One of the livestock that has the potential to meet the needs of animal protein is dairy cow with the main product being milk.

Dairy cow's milk production is strongly influenced by the availability of feed both in quality and quantity [2]. Feed is also an aspect that really determines the sustainability of livestock business because 60-70% of the total production costs are feed costs [3] [4]. Efficient production will be achieved if cheap feed is available and meets the needs of livestock [2].

The availability of feed, especially forage, is the main feed ingredient for ruminants [5]. Forage is decreasing because of the narrowness of agricultural land that can produce forage feed [3]. This is due to the increasing construction of buildings for housing, offices and industry. Therefore, it is necessary to do other alternatives in the provision of forage feed so that the growth and production of livestock increases [6].

Ambopi Village, North Tongauna District, Konawe Regency has a land area of 402 km2. Most of the area is designated as rice fields. In Ambopi Village there are 12 dairy cows consisting of 3 lactating dairy cows, 7 adult dairy cows and 2 calves (male and female). The average milk production of dairy cows in Ambopi Village is 1.16-3.27 kg/head/day. The feed provided is in the form of forage fodder planted around the rice fields. However, the production, availability and quality are not yet known so it is necessary to do research related to this.

2. MATERIALS AND METHODS

This research was conducted on a dairy farm in Ambopi Village, North Tongauna District, Konawe Regency, Southeast Sulawesi Province. The materials used in the study were all types of forage found in North Tongauna Village, namely Elephant grass, Odot grass and Setaria grass. The equipment used in this study included a portable electronic scale with a capacity of 50 kg with a sensitivity of 0.001 g Weiheng brand for weighing forage, a drying oven, a set of equipment for measuring crude protein content (Kjeldahl), and a furnace to test the ash content and organic matter.

Data were collected by direct measurement on plants to determine the production and quality of forage. Forage samples were taken by cutting plant stems ±10-15 cm from the ground. The results of the cuts were weighed to determine the fresh weight and then put into a paper bag to be dried in an oven at a temperature of 60 oC until the weight was constant. After that, the forage samples were milled with a filter hole diameter of 1 mm and then analyzed for Dry Matter (DM), Organic Matter (OM) and Crude Protein (CP), Crude Fiber (CF) and Extracted Material Without Nitrogen [7].

The observed research variables included forage nutritional content (DM, OM, CP and CF); forage nutrient production and forage production potential as dairy cattle feed in Ambopi Village. Analysis of nutrient content was carried out following the [7] procedure. Forage nutrient production was calculated based on the production of DM, CP and TDN in an area in a certain year with the following calculations [6]:

DM production (tonnes/year) = fresh forage production (tonnes/year) x DMcontent (%)

CP production tons/year) = DM production (tons/year) x CP content (%)

TDN production (tonnes/year) = DM production (tonnes/year) x TDN content (%)

Forage production potential is calculated referring to [6]:

$$\text{Potential DM/CP/TDN of forage (\%)} = \frac{\text{Production DM/CP/TDN of a commodity (ton/year)}}{\text{Production DM/CP/TDN all forage commodity (ton/year)}} \text{x100}$$

The data obtained were analysed descriptively to describe the availability and potential of forage production for dairy cattle in Ambopi Village, North Tongauna Sub District.

3. RESULTS AND DISCUSSION

3.1. Forage Nutrient Content

The results show that in Ambopi Village, North Tongauna Sub District, there are only 3 types of forage cultivated by farmers as dairy cattle feed, namely elephant grass, odot grass and setaria grass. The nutritional content of forage dairy cattle in Ambopi Village, North Tongauna District, Konawe Regency can be seen in Table 1.

The content of OM, CP, CF and TDN of elephant grass (*Pennisetum purpureum*) in this study is 88.64%; 14.62%; 28.20% and 36.84%. The OM content in this study is not much different from [8], which is 88.30%. This may be caused by the influence of light intensity or sunlight. [9] stated that the lower the light intensity, the lower the growth and the production of forage in South Sulawesi.

The CP value of elephant grass in this study is higher than [10] 11.23-12.65%. This is caused by climatic factors, cutting age and soil fertility. According to [10] season, rainfall, age, soil fertility and crop management can affect the nutrient content of feed.

Table 1. Nutrient content of forages that can be used as feed for dairy cattle in Ambopi Village

Type of plant	Nutrient Content (% DM)			
	OM	CP	CF	TDN
Elephant grass	88.64±0.63	14.6±0.24	28.20±0.54	36.84±0.22
Odot grass	89.64±0.40	10.7±0.41	21.30±0.47	61.59±0.17
Setaria grass	90.93±0.21	16.4±0.16	28.50±0.28	34.12±0.26

Note : OM = Organic matter, CP = Crude protein, CF = Crude fiber, TDN = Total Digestible Nutrien

Table 2. Production and potential of grass as dairy cattle feed

Type of plant	Production (tonnes/ha/year)			Grass potential (%)		
	DM	CP	TDN	DM	CP	TDN
Elephant grass	59.63±0.52	8.71±0.46	21.97 ±0.42	69	74.17	57.83
Odot grass	20.36± 0.38	2.17±0.27	12.54 ±0.51	2.73	3.31	2.13
Setaria grass	14.10±0.22	2.31±0.40	4.81 ±0.36	28.47	22.50	40.02
Total	94.09±0.37	13.19±0.36	39.32±0.43	100	100	100

Note : DM = Dry matter, CP = Crude protein, TDN = Total Digestible Nutrient

The content of OM, CP, CF and TDN of odot grass (*Pennisetum purpureum* cv Mott) in this study is 89.84%; 10.7%; 21.3% and 61.59%. The OM value of odot grass in this study is higher than [8], which is 85.55%. The difference is probably due to the different soil structure and weather conditions in East Java and Southeast Sulawesi. Odot grass is a superior type of grass that has maximum productivity and growth. The soil structure greatly affects plant growth and production [11].

The CP and CF values of odot grass in this study are lower than [11] by 14% and 38.3%. The difference is probably caused by the effect of the length of time cutting. According to [11] the length of forage cutting can affect the nutritional content produced by plants.

The content of OM, CP, CF and TDN of Setaria grass (*Setaria sphacelata*) in this study is 90.93%; 16.45%; 28% and 36.71%, respectively. The OM value of setaria grass in this study is higher than [12] which is 78.8-86.06%. The difference is probably caused by climate and environmental factors. The setaria grass is planted around the rice fields that do not allow shade as the plants tend to be older and have high organic matter. According to [9], production growth and nutritional content of superior forage are influenced by different levels of shade.

The CP value of setaria grass in this study is lower than [12], which is 20.31%. However, the CF value of setaria grass in this study is not much different from the range of SK content of 24.02-30.41% obtained by [12]. According to [12] the difference may be caused by the age of harvest of the plants. The harvest age of setaria grass in this study is longer than [12]. The longer the harvest life of setaria grass, the lower the protein and crude fiber content [12].

3.2. Grass Nutrient Production and Dairy Cattle Needs

The production of grass nutrients as dairy cattle feed in Ambopi Village, North Tongauna District, Konawe Regency can be seen in Table 2.

DM production of elephant grass (*Pennisetum purpureum*) in this study is 59.63 tons/ha per year. This production is higher than that of [13] (51.40 tons/ha per year). This difference may be caused by differences in soil conditions, climate, use of fertilizers and forage spacing as stated by [14]. The average body weight of adult dairy cattle in Ambopi Village is 263.39 kg/head. If the need for DM for adult dairy cattle is 3% of body weight, then the need for DM for dairy cattle is 7.91 kg/head/day. Thus, the number of cattle that can be reared with the potential of the grass is 2.4 AU (2 adult dairy cattle and 1 heifer). CP production in this study (8.71 tons/ha/year) is higher than [15] which is 5.03 tons/ha/year. This difference is caused by the high production of elephant grass DM in this study compared to [15].

Likewise, the production of DM odot grass (*Pennisetum purpureum* cv Mott) of 20.36 tons/ha/year can only accommodate 0.07 AU of dairy cows or in other words, BK production of odot grass cannot be used as dairy cattle feed for both children and adults because their numbers are very limited in Ambopi Village. Odot grass DM production in this study is lower than the results of [16] study, which is 21.8-31.6 tons/ha/season. Odot grass production is influenced by various factors, including agro-climate, spacing and cultivation management [17].

The production of DM setaria grass (*Setaria sphacelata*) in this study is also not much different from the production of elephant grass and Odot which cannot accommodate 12 dairy cows in Ambopi Village. BK production of Setaria grass in this study (14.10 tons/ha/year) can only accommodate 1.4 ST (1 adult dairy cow and 1 heifer). The BK production of setaria grass in this study is higher than [18] which is 10.5 kg.

In general, the low capacity of dairy cattle in Ambopi Village indicates that the level of forage availability in the area has not been able to accommodate the existing 12 dairy cows. Therefore, it is necessary to provide alternative uses of other forages sourced from agricultural waste. Agricultural waste such as soybean husks and rice straw can be used as dairy cattle feed [19].

3.3. Potential of Grass as Dairy Cattle Feed

The potential of grass as dairy cattle feed in Ambopi Village, North Tongauna District, Konawe Regency can be seen in Table 2.

The DM portion of elephant grass (69%) in this study has more potential to meet the feed needs of dairy cattle compared to setaria grass (28.47%) and odot grass (2.73%). Elephant grass has a greater chance of being used as a source of dairy cattle feed in Ambopi Village, North Tongauna District, Konawe Regency, Southeast Sulawesi Province.

4. CONCLUSION

The types of grass found in Ambopi Village, North Tongauna District and can be used as feed for dairy cattle are elephant grass (*Pennisetum purpureum*), odot grass (*Pennisetum purpureum cv most*) and Setaria grass (*Setaria sphacelata*). Nutrient production of the three grasses is 94.09 tons/ha/year CP, 13.19 tons/ha/year CP and 39.32 tons/ha/year TDN. Elephant grass has the potential to be used as a source of feed for dairy cows in Ambopi Village. The number of dairy cows that can be accommodated is 5 AU.

AUTHORS' CONTRIBUTIONS

Nur Santy Asminaya is responsible for the whole research activity, data analysis and writing article for publication. Syamsuddin and Nurliana are responsible for collecting data and writing research report.

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